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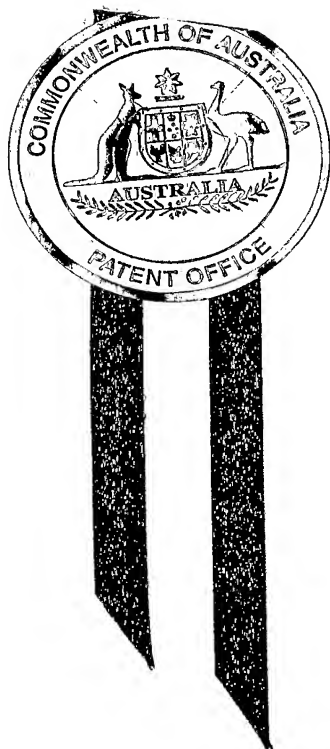


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I, JANENE PEISKER, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2004900639 for a patent by MITCHELL AUSTRALASIA PTY LTD as filed on 10 February 2004.



WITNESS my hand this
Seventeenth day of February 2005

A handwritten signature in dark ink, appearing to read 'J. R. + C.'.

JANENE PEISKER
TEAM LEADER EXAMINATION
SUPPORT AND SALES

AUSTRALIA
Patents Act 1990

PROVISIONAL SPECIFICATION

Invention Title: **Apparatus for embedding pipelines and similar elongate
members in trenches**

The invention is described in the following statement:

**APPARATUS FOR EMBEDDING PIPELINES AND SIMILAR ELONGATE
MEMBERS IN TRENCHES**

The present invention relates to apparatus for use in embedding pipelines or similar elongate conduits or members in preformed trenches.

5 It is conventional practice when laying a pipe line or the like underground to form a trench extending in the required direction and at the required depth. A fine particulate bedding material is then laid in the base of the trench which may be sand or similar delivered to the site, the material being dropped into the trench at spaced locations by a front end loader or the like with the material then being
10 spread and levelled by various means such as manually by workmen with shovels or perhaps by dragging a chain along the base of the trench. Once the bedding material has been spread and levelled, the pipeline (or similar) is laid thereon and subsequently further fine particulate material is placed around and over the pipeline (or similar). Once this process has been completed, the trench is back
15 filled with normal earth, rock etc previously excavated from the trench. It is desirable that the sand or similar particulate material be relatively evenly packed or distributed about the pipeline as any significant gaps, openings or cavities may cause undesirable loadings on the pipeline wall.

 The present invention aims at providing apparatus usable in applications of
20 the above discussed type that will, in a relatively simple and effective manner, distribute and level particulate material in the base of the trench and/or ensure the particulate material around and, if provided, above the pipeline (or the like), is uniformly packed such that significant gaps or cavities are not left in the material.

 According to a first aspect of the invention, there is provided apparatus for
25 compacting fine particulate earth or sand material around an elongate member laid in a trench, said apparatus including at least one disc member having a plurality of teeth like formations around its periphery and mount means for said at least one disc member permitting said disc member to roll through said fine particulate material in said trench, said mount means including connection means
30 enabling said apparatus to be connected to machinery for moving the apparatus along said trench.

Preferred features of the aforesaid aspect may be as defined in claims 2 to 4 annexed hereto, the subject matter of these claims being included in the disclosure of this specification by this reference thereto.

According to a second aspect of this invention there is provided equipment
5 for spreading and levelling fine particulate earth or sand material already deposited in the base region of a preformed trench, said equipment including a pair of laterally spaced side walls supported by skid members adapted, in use, to be positioned on a base surface of the trench, each said skid member extending generally in line with the direction of the trench and being located adjacent a side
10 wall of the trench, said equipment including cross brace means for maintaining spacing of said side walls during use, wall means closing a cross-sectional zone of said equipment between said side walls having a lower edge adapted to provide a level surface to said fine particulate material spread by said wall means, and connection means enabling said equipment to be connected to machinery for
15 moving the equipment along said trench supported on the base of said trench.

Preferred features of this second aspect may be as defined in claims 6 to 8 annexed hereto, the subject matter of these claims being included in the disclosure of this specification by this reference thereto.

In accordance with a third aspect, the present invention provides a method
20 of laying and embedding a pipeline or similar elongate member in a trench, said method involving the steps of:

- (i) depositing fine particulate bedding material into the trench for use as bedding under the elongate member;
- (ii) placing first apparatus in the trench, said first apparatus having spaced
25 side wall means supported by support means resting on a base of said trench with said side wall means located adjacent respective side walls of said trench, said first apparatus also including a transverse wall member having a lower edge spaced upwardly from the base of said trench;
- (iii) moving said first apparatus along said trench while said transverse wall
30 member spreads said fine particulate material and the lower edge of said transverse wall means provides a level surface for said fine particulate material;

- (iv) laying said elongate member on said level surface of said fine particulate material;
- (v) depositing a further quantity of fine particulate material into said trench such that said further quantity at least partially fills the space between said elongate member and the side walls of the trench;
- (vi) passing a second apparatus along said trench at least once, said second apparatus including at least one disc member having a plurality of teeth like formations around its periphery whereby the or each said disc member rolls through said fine particulate material on either side of said elongate member; and
- (vii) back filling the trench.

Preferred features of this third aspect may be as defined in claims 11 to 14 annexed hereto, the subject matter of these claims being included in the disclosure of this specification by this reference thereto.

Preferred embodiments of this invention will now be described with reference to the accompanying drawings, in which:

Fig 1 is a schematic transverse view of a compactor apparatus according to one aspect of the present invention in a position of use within a trench;

Fig 2 is a schematic side view of the compactor apparatus shown in Fig 1;

Fig 3 is a side view of preferred spreading and levelling apparatus according to a second aspect of the present invention;

Fig 3a is a plan view along line A-A of Fig 3; and

Figs 4 and 5 are respectively front and rear views of the apparatus shown in Fig 3.

Referring first to Figs 3 to 5, equipment 10 is illustrated for spreading and levelling fine particulate material, typically sand or the like, imported to the site of the trench 11 and deposited therein at spaced locations. The equipment 10 includes a pair of side walls 12, 13, each being supported on skid members 14 upturned at their forward ends 15 to facilitate sliding movement along the trench 11. The forward end of the side walls 12, 13 have upright members 16, 17 with plates 18 extending forwardly to enable pulling chains, bars or any other suitable means 19 to be connected thereto, selectably at adjustable heights. The pulling chains 19 may be connected to any suitable movable machinery to drag the

equipment 10 along the trench 11 in the forward direction indicated by arrow 21 while the support skid members 14 remain on the base 22 of the trench. The equipment 10 includes a generally open front face 20, two or more intermediate cross brace members 23, 24, each being selectably adjustable so as to vary the transverse distance between the side walls 12, 13 to enable adjustment for varying trench widths, and a rear wall member 25 that is also adjustable in width similarly to the cross brace members such that the equipment 10 might be varied in width to accommodate varying trench widths. The rear wall member 25 is also supported slidably in guides 26 at either side wall so as to be capable of adjustment in a vertical direction to raise or lower the bottom edge 27 of the wall member 25. This vertical adjustment might be achieved by a winch 28 and cable 29 secured to the wall member 25, however, once vertical adjustment has been achieved, the wall member 25 is conveniently fixed in the desired position by bolts or similar passed through openings 30. The lower edge 27 of the wall member 25 may have a generally centrally located downwardly formed protuberance 31 adapted to form a groove in the otherwise level surface 32 of the sand or similar fine particulate material squeezed beneath the edge 27 from the pile 33 of sand or similar fine particulate material pushed along the trench by the wall member 25 as the equipment 10 is dragged along the trench 11.

Referring now to Figs 1 and 2, once sand or similar fine particulate material has been spread and levelled along the base 22 of the trench 11 using equipment as shown in Figs 3 to 5, a pipeline 40 or similar elongate member can be positioned along the trench lying in the central groove 34 in the particulate material. Thereafter further sand or fine particulate surround material 41 and 42 might be positioned on either side of the pipeline 40 on top of the first laid bedding material such that the pipeline is held in its as laid position. It is, however, desirable to ensure that there are no significant cavities around the pipeline once the trench has been completely back filled to avoid undesirable loading on the pipeline. To avoid such cavities, apparatus 50, shown in Figures 1 and 2 is used. The apparatus 50 preferably includes a pair of disc members 51, 52, each having teeth formations 53 around their periphery. In the illustrated embodiment, the teeth formations 53 are square or rectangular in shape but other configurations are believed to also be useful. A central mount member 54 is

provided which includes connection means 55, conveniently in the form of quick hitch ears or the like to enable interchange connection with the booms 56 of an excavator. An adjustable length axle 57 passes through the central mount member 54 and is rotatable relative thereto, the disc members 51, 52 being
5 secured to the lateral ends of the axle 57. The adjustable length axle enables the spacing between the disc members 51, 52 to be varied to adjust for variable width pipelines / trenches. As has been shown in the drawings, each disc member 51, 52 might include cut out openings 58 to limit weight of the apparatus. In use, a connected excavation might move the apparatus 50 along the trench with the disc
10 members 51, 52 rolling through the fine particulate material as illustrated to compact the material on either side of the pipeline. In this manner, any cavities that might exist are collapsed to provide a surround and bed of fine particulate material that is relatively uniform in density.

Once the discs 51, 52 have performed their compacting effect, the trench
15 11 may be back filled with previously excavated trench earth material in the usual manner.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Apparatus for compacting fine particulate earth or sand material around an elongate member laid in a trench, said apparatus including at least one disc member having a plurality of teeth like formations around its periphery and mount
5 means for said at least one disc member permitting said disc member to roll through said fine particulate material in said trench, said mount means including connection means enabling said apparatus to be connected to machinery for moving the apparatus along said trench.
2. Apparatus according to claim 1 wherein two said disc members are
10 provided spaced apart but rotatable about a common axis, said mount means including a shaft interconnecting said disc members.
3. Apparatus according to claim 2 wherein the spacing distance between said disc members is selectably adjustable.
4. Apparatus according to any one of claims 1 to 3 wherein said teeth like
15 formations have a square or rectangular shape.
5. Equipment for spreading and levelling fine particulate earth or sand material already deposited in the base region of a preformed trench, said equipment including a pair of laterally spaced side walls supported by skid
20 members adapted, in use, to be positioned on a base surface of the trench, each said skid member extending generally in line with the direction of the trench and being located adjacent a side wall of the trench, said equipment including cross brace means for maintaining spacing of said side walls during use, wall means closing a cross-sectional zone of said equipment between said side walls having
25 a lower edge adapted to provide a level surface to said fine particulate material spread by said wall means, and connection means enabling said equipment to be connected to machinery for moving the equipment along said trench supported on the base of said trench.

6. Equipment according to claim 5 wherein said cross brace means and said wall means are adjustable to enable the transverse spacing between said side walls to be selectably adjustable to accommodate differing width trenches.

5 7. Equipment according to claim 5 or claim 6 wherein said wall means is adjustable in a vertical direction to selectably vary the distance between the lower edge of the wall means and the base of the trench.

10 8. Equipment according to any one of claims 5 to 7 wherein said wall means includes at least one groove forming protuberance extending downwardly in the lower edge, the or each said protuberance being positioned intermediate the side walls of the equipment.

9. Equipment according to any one of claims 5 to 8 wherein said wall means is located at or adjacent to a rear end of said side walls.

10. A method of laying and embedding a pipeline or similar elongate member in a trench, said method involving the steps of:

- 15 (i) depositing fine particulate bedding material into the trench for use as bedding under the elongate member;
- (ii) placing first apparatus in the trench, said first apparatus having spaced side wall means supported by support means resting on a base of said trench with said side wall means located adjacent respective side walls of said trench, said first apparatus also including a transverse wall member having a lower edge spaced upwardly from the base of said trench;
- 20 (iii) moving said first apparatus along said trench while said transverse wall member spreads said fine particulate material and the lower edge of said transverse wall means provides a level surface for said fine particulate material;
- 25 (iv) laying said elongate member on said level surface of said fine particulate material;

- (v) depositing a further quantity of fine particulate material into said trench such that said further quantity at least partially fills the space between said elongate member and the side walls of the trench;
- (vi) passing a second apparatus along said trench at least once, said second apparatus including at least one disc member having a plurality of teeth like formations around its periphery whereby the or each said disc member rolls through said fine particulate material on either side of said elongate member; and
- (vii) back filling the trench.
- 10 11. A method according to claim 10 wherein the trench is back filled with previously excavated material from the trench.
12. A method according to claim 10 or claim 11 wherein the fine particulate material is provided to the trench site from a remote source.
- 15 13. A method according to any one of claims 10 to 12 wherein the second apparatus includes two spaced apart said disc members, a said disc member being located on either side of the elongated member.
14. A method according to claim 13 wherein the second apparatus is passed along said trench only once.

20 **DATED** this 10th day of February 2004
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30 P23741AUP1 SKP/JC

fig 1

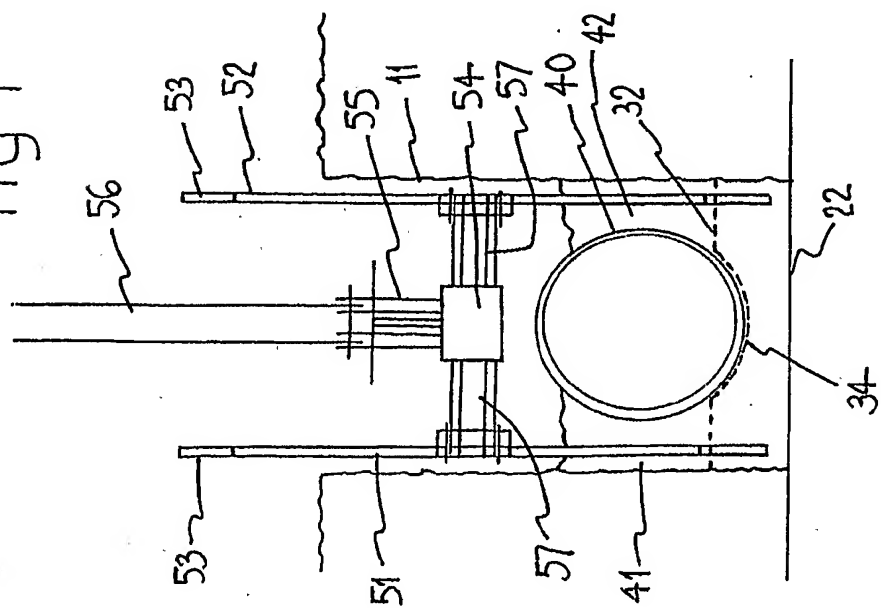
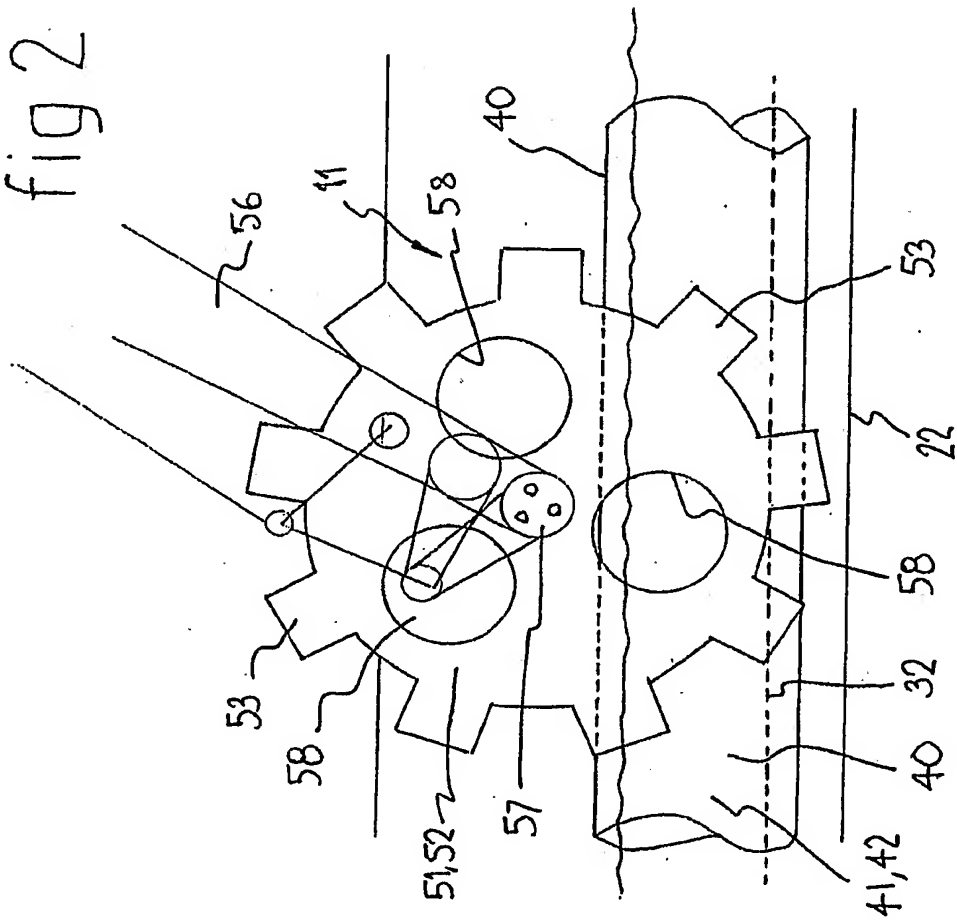


fig 2



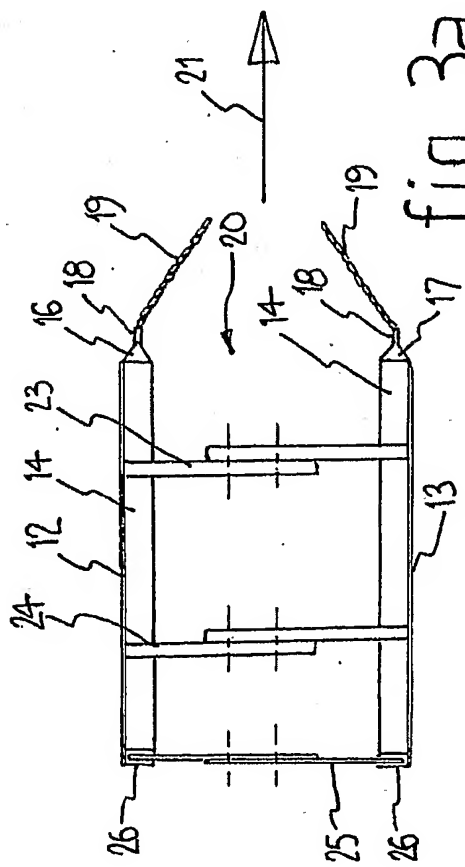


fig 3a

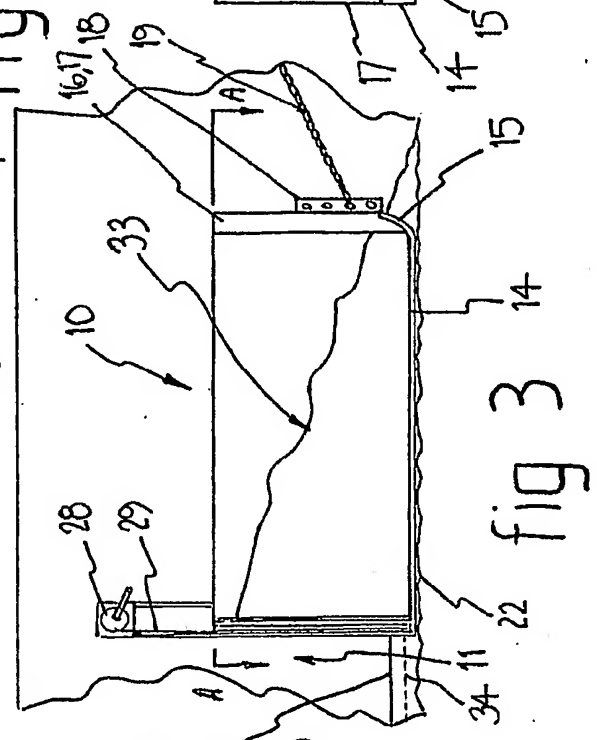


fig 3

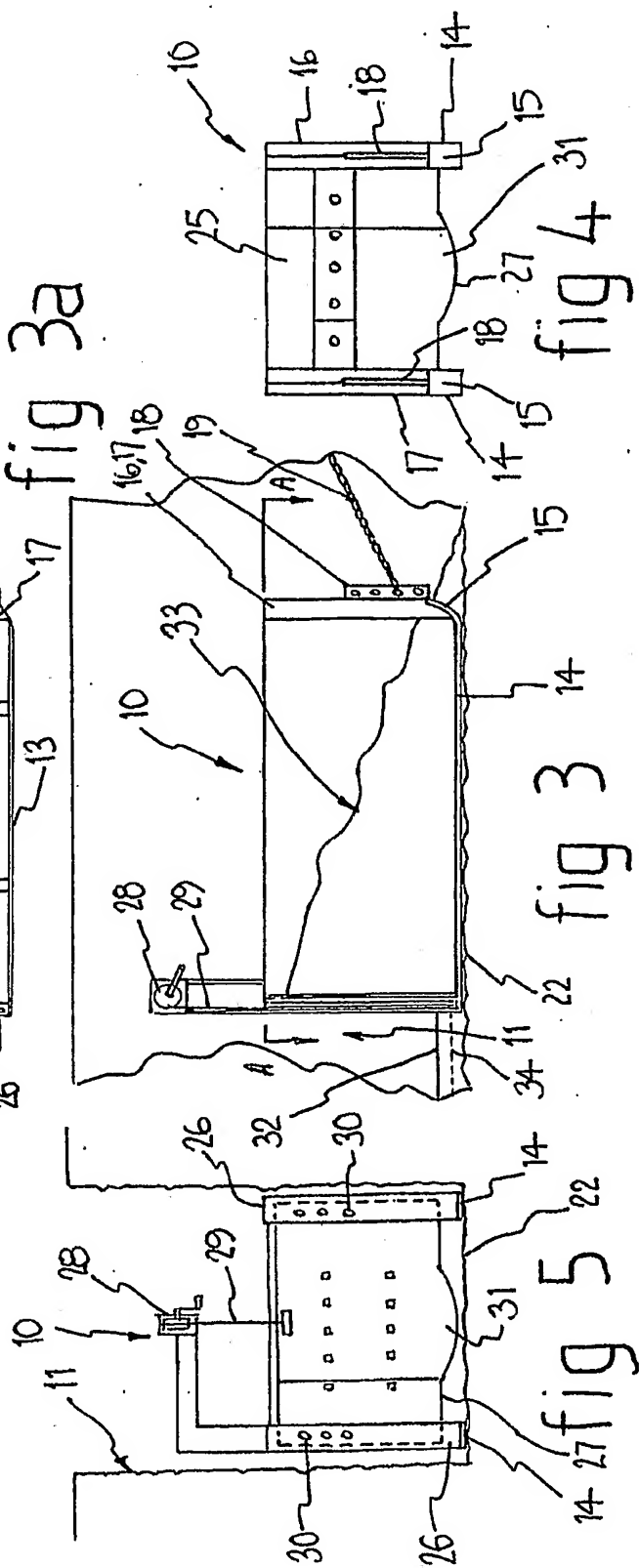


fig 4

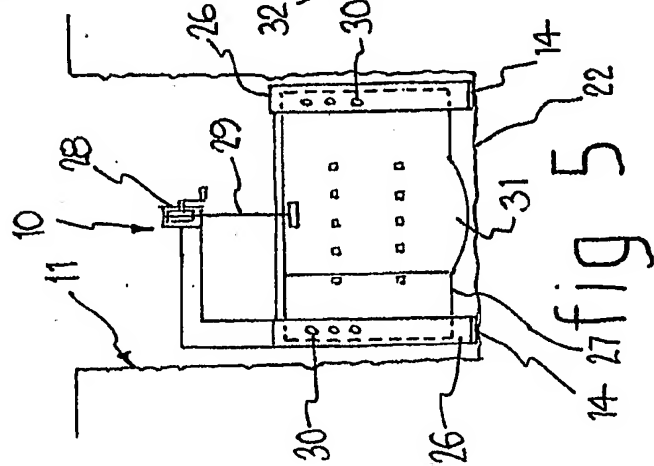


fig 5